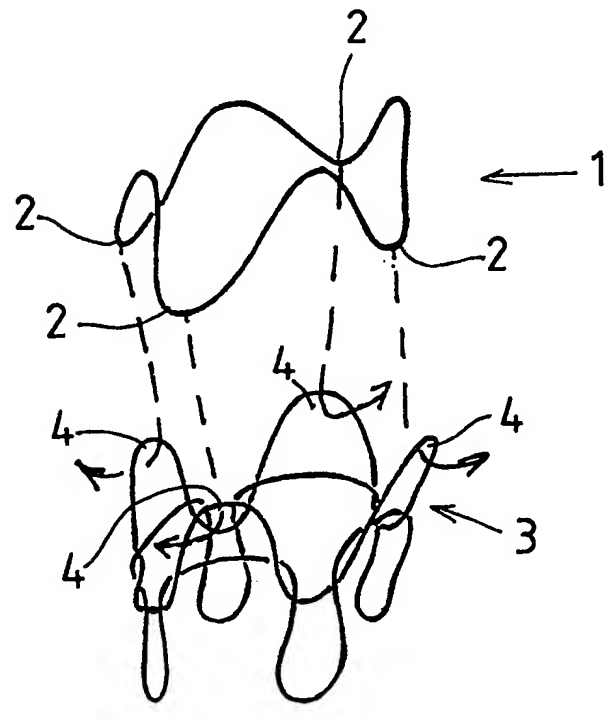




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(21) International Application Number: PCT/FI94/00495 (22) International Filing Date: 4 November 1994 (04.11.94) (30) Priority Data: 934887 4 November 1993 (04.11.93) FI (71)(72) Applicant and Inventor: KANGASVUORI, Matti [FI/FI]; Liisanaro 3, FIN-13210 Hämeenlinna (FI). (74) Agent: PAPULA REIN LAHTELA OY; P.O. Box 981, Salomonkatu 17 B, FIN-00101 Helsinki (FI).		(81) Designated States: US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>In English translation (filed in Finnish).</i>
(54) Title: CHAIN AND A METHOD FOR MAKING THE CHAIN (57) Abstract <p>A procedure for making a chain from filamentary material, and a corresponding chain. In the procedure, separate closed rings (1) are made of filamentary material, the ring is bent to present at least three loops (2), the loops are passed through the loops (4) of the preceding ring (3), and the loops are bent upward, that is in the assembling direction of the chain, to receive the corresponding loops of the next ring.</p> 		

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CHAIN AND A METHOD FOR MAKING THE CHAIN.

The present invention concerns a procedure as defined in the preamble to Claim 1 for making a chain,
5 and a chain as defined in the preamble to Claim 8.

The chain constituting the object of the invention is primarily intended to be used as suspension chain in needs of the jewelry industry, e.g. as a necklace chain or bracelet chain. In such uses the structure (appearance) of the chain is the main and determining factor.
10

On the basis of appearance, the most closely equivalent chains are the so-called spiral chain and the so-called Etruscan chain.

15 The spiral chain is made of one or several continuous filaments. The objectionable feature of the spiral chain is its poor bendability, due to the way of making it of one single filament. The durability of the spiral chain is also fairly poor because in such a chain comparatively sharp kinks are made in the chain,
20 which invariably detract from its strength. Moreover, repairing a spiral chain is an awkward job, because a junction has to be made in the normally continuous filament in order to repair the chain.

25 An Etruscan chain is made of separate, oval shaped loops, which are disposed within each other, "loop-in-loop". The drawback of the Etruscan chain is its rigidity (poor flexibility), which is due to the manufacturing process, making the chain of loops going
30 one into the other. Owing to the manufacturing mode, the chain will also be comparatively heavy. Repairing an Etruscan chain is also cumbersome work, owing to the compact structure of the chain.

The object of the invention is to eliminate
35 the drawbacks mentioned. Specifically, the object of the invention is to disclose a resilient, strong, light construction, easy to repair, also industrially easy to

produce, and visually attractive chain, and the manufacturing procedure thereof.

Regarding the features characterizing the invention, reference is made to the claims section.

5 In the procedure of the invention, separate closed rings are made of filamentary material. The rings are bent to have at least three loops advantageously with regular spacing, that is, the circumference of the ring is pressed inward so that outward extending
10 loops are formed between the points where pressure is applied. The loops are thereafter slipped through the loops of the preceding ring on the chain which is being manufactured, and the loops of the ring are bent upward, or in the direction in which the chain is
15 growing, to receive the corresponding loops of the next ring.

Advantageously, the separate closed rings are produced by winding the filamentary material to a helix, cutting up the helix into separate pieces and
20 joining the ends of each piece to form a closed ring.

Advantageously, the loops on the ring are initially bent towards the loops of the preceding ring, i.e., towards the end of the chain in the process of forming, which makes it easier to pass the loops of the
25 ring through those of that preceding ring on the end of the chain. On having been slipped through, the downward bent loops are then turned up in the opposite direction, to receive the downward pointing loops of the ring next in order to be mounted.

30 Advantageously, the loops which are made on the ring are bent in such manner that the ring containing these loops will present a roundedly and smoothly undulating or meandering stellate configuration with no sharp angles or abrupt bends. Hereby the
35 chain which is formed will be uniform in quality, and strong.

Advantageously, the chain which is finished as

to its length is calibrated by drawing it through a calibration ring, whereby the chain acquires the final, uniform cross sectional dimension.

The chain of the invention comprises a plurality of closed rings connected with each other and which in aggregate constitute an elongated chain. As taught by the invention, the rings are separately closed and connected to each other by bending them so that each ring comprises at least three loops which are passed through the corresponding loops of the preceding ring on the chain and have been bent forward in the assembly direction of the chain, to receive the corresponding loops of the next ring.

Advantageously, the rings used in the invention are metal rings and specifically in needs occurring in jewelry industry, noble metal rings.

The chain of the invention can equally be made of steel rings, and appropriate dimensioning provided it may then be used e.g. as protective and transport packaging for elongated objects because the chain defines in itself a hollow space and the shell thereof is comparatively thick and resilient. In this way an appropriately dimensioned chain will furnish efficient protection to the elongated object within it against external impacts.

In the chain structure of the invention, the ring may equally have several loops and their location relative to each other may be suitably variable, whereby it is possible to produce chains, and pieces of jewelry, of different cross sections and different appearance so that the shape of the chain varies from flat to completely round. The chain may be made variable of its cross section as well.

The advantage of the invention over prior art is that in this way a very thin and flexible chain can be produced without sacrificing any of its durability, owing to the fact that in no phase are any sharp angles

made in the filament which is used or in the individual rings. The production of the chain of the invention is easy to mechanize, and in mechanical production this chain will be economically well competitive owing to its strength/weight ratio.

In the following the invention is described in detail, referring to the enclosed drawings, wherein Fig. 1 presents the ring used in a chain according to the invention,
Fig. 2 presents the ring bending step,
Fig. 3 presents the chain assembly step, and
Fig. 4 shows the finished chain construction.

The chain of the invention is made as follows. First, a number of rings 1 as depicted in Fig. 1, or round, solid rings, are made. The ring 1 is pressed with suitable members 5 in the direction towards the centre of the ring so that loops 2 are formed of the ring periphery, between the points where pressure is applied, in the present embodiment four loops. The loops, as well as the intervening ring regions, are smoothly curved and round-shaped.

As shown in Fig. 3, the loops 2 of the ring being mounted on the end of the chain are bent in the direction towards the end of the chain, that is downward in Fig. 3, and the loops 2 can then be slipped through the corresponding loops 4 of the preceding ring 3 on the end of the chain. The loops 4 are pointing upward, that is towards the new ring 1 which is being mounted. After the loops 2 of the ring 1 have been passed through the loops 4 of the ring 3, the loops 2 are turned upward, whereby they are now ready to receive the downward bent loops of the ring to be mounted next.

By carrying on in this way and by joining to each other rings provided with loops, one obtains a chain as shown in Fig. 4, which is highly elastic, light in construction and strong.

In the foregoing the invention has been described by way of example with the aid of the drawings, while different embodiments can be contemplated within the scope of the inventive idea delimited by the
5 claims.

CLAIMS

1. A procedure for making a chain from filamentary material, characterized in that

- 5 - separate closed rings (1) are made of filamentary material,
- the ring is bent to present at least three loops (2),
- the loops are passed through the loops (4) of the preceding ring (3), and
10 - the loops are bent upward, that is in the assembling direction of the chain, to receive the corresponding loops of the next ring.

2. Procedure according to claim 1, characterized in that the rings (1) are made by forming the
15 filamentary material into a helix, cutting the helix up into separate pieces and joining the ends of the piece to produce a closed ring.

3. Procedure according to claim 1 or 2, characterized in that a loop (2) is formed on the ring
20 (1) by pressing its periphery inward at three points at least, whereby loops are formed between the points where pressure is applied.

4. Procedure according to any one of claims 1-3, characterized in that the loops (2) of the ring
25 (1) to be mounted are bent towards the loops (4) of the preceding ring (3), or towards the end of the chain in the process of being made, before they are passed through the loops of the preceding ring.

5. Procedure according to claim 4, characterized in that after being passed through, the bent
30 loops (2) are bent in opposite direction to receive the corresponding loops of the next ring.

6. Procedure according to any one of claims 1-5, characterized in that the loops (2,4) of the ring
35 (1,3) are formed to have a curved and round shape free of sharp angles.

7. Procedure according to any one of claims

1-6, characterized in that the chain is calibrated by drawing it through a calibration ring.

8. A chain comprising a plurality of closed rings (1,3) connected to each other, which in aggregate
5 form an elongated chain, characterized in that the rings (1,3) are separately closed and are connected to each other by bending so that the ring (1) comprises at least three loops (2) which have been passed through the corresponding loops (4) of the preceding ring (3)
10 on the chain and have been bent forward in the assembly direction of the chain for passing through them the loops of the next ring.

9. Chain according to claim 8, characterized in that the rings (1,3) are metal rings.

15 10. Chain according to claim 8 or 9, characterized in that the chain is an adornment chain or a protection and transporting chain for elongated objects.

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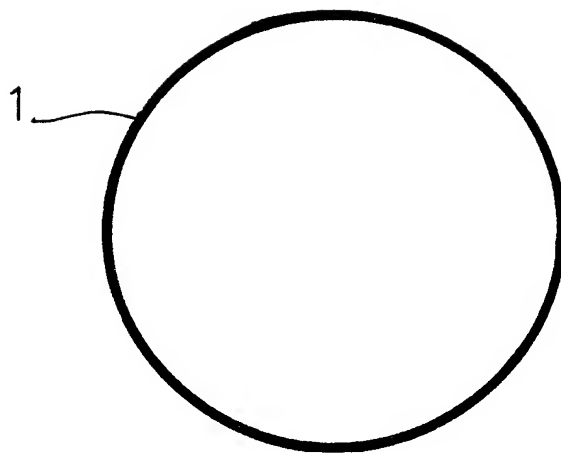


Fig 1

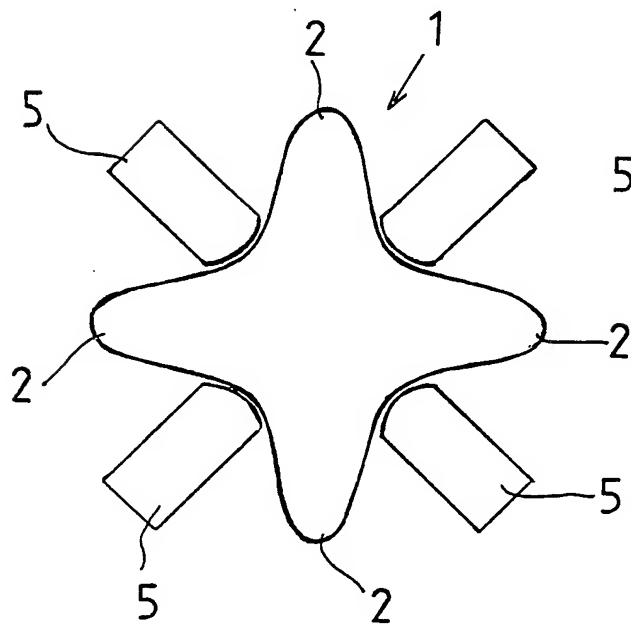


Fig 2

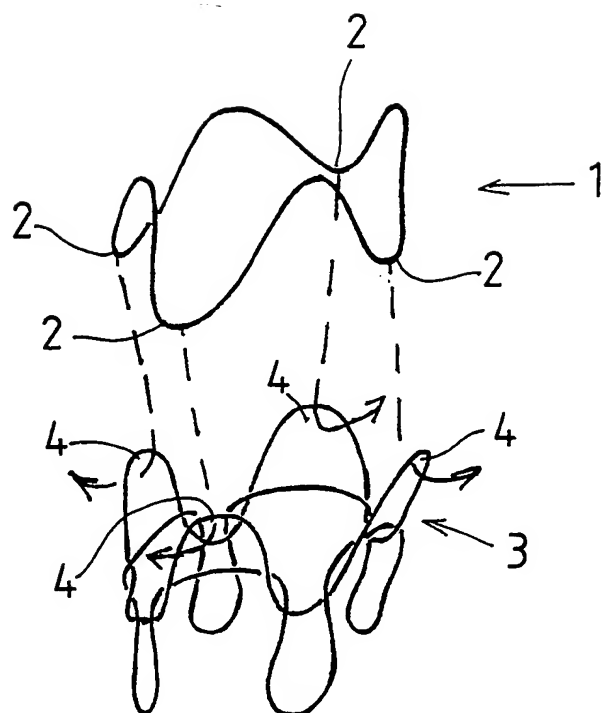
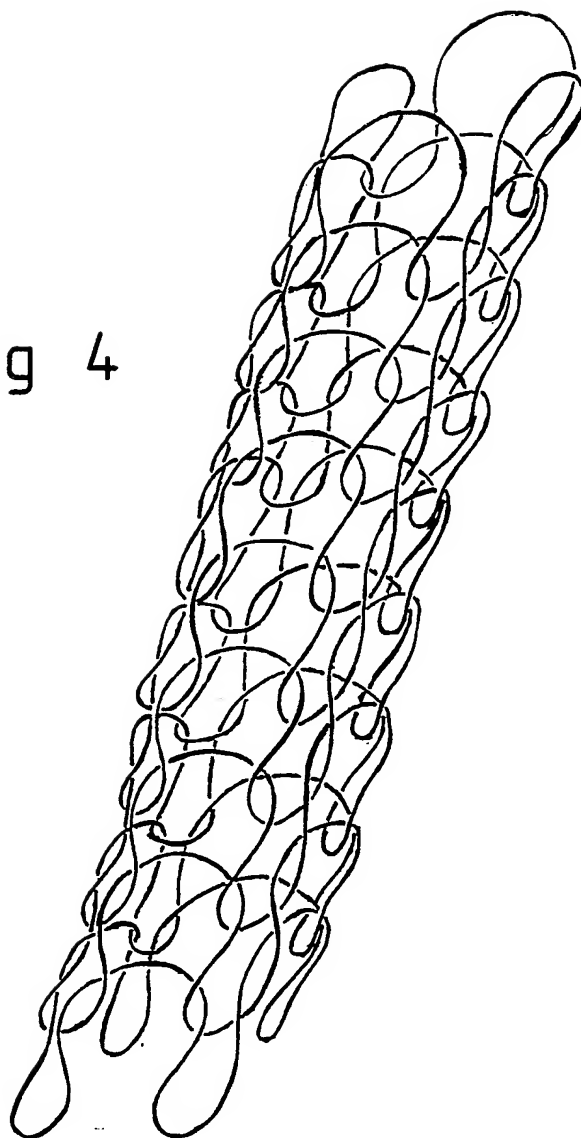


Fig 3

Fig 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 94/00495

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A44C 11/00

According to International Patent Classification (IPC) or to both national classification and IPC

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IPC6: A44C, B21L

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE, A, 2364857 (LENFANT, JACQUES; LABARTE, MAURICE), 11 July 1974 (11.07.74) --	1-10
A	CH, A, 490039 (LUCIEN EMILE VACHEY), 30 June 1970 (30.06.70), figures 1-8 --	1-10
A	DE, A1, 3706090 (C.M.S. S.R.L. COSTRUZIONE MACCHINE SPECIALI), 3 Sept 1987 (03.09.87) -- -----	2

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Information on patent family members

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